Journal of Applied Spectroscopy 2014 vol.81 N2, pages 188-192

# Optical Properties of Polyimide Films Implanted with Ni+ Ions

Bumai Y., Dolgikh N., Kharchenko A., Valeev V., Nuzhdin V., Khaibullin R., Nagim F., Lukashevich M., Odzhaev V.
*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

## Abstract

Transmission and refl ection spectra of polyimide fi lms 40-μm thick implanted with 40-keV Ni+ ions at fl uences 2.5·1016-1.5·1017 cm-2 and ion-beam current density 4, 8, and 12 μA/cm2 were studied in the range 200-1100 nm. It was shown that the optical transmission coeffi cient decreased smoothly after implantation as a result of light absorption and scattering in the modifi ed polymer layer containing nano-sized inclusions of C and Ni. The appearance of a broad refl ection band in the range 700-1100 nm in spectra from the implanted polymer and the reverse side of the polymer was due to a high Ni content in the implanted layer. The refractive index of the modifi ed implanted polymer layer that varied in the range 1.25-2.32 at 620 nm depending on the fl uence was determined by modeling the passage of light through the bilayer modifi ed layer/polymer matrix taking into account multiple refl ections at the interfaces. © 2014 Springer Science+Business Media New York.

http://dx.doi.org/10.1007/s10812-014-9908-7

## Keywords

ion implantation, nickel, polyimide, refl ection, refractive index, transmission